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# QUININE PROPHYLAXIS AND LATENT MALARIA INFECTION.

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During the war and since, evidence has been accumulated which shows that quinine prophylaxis is not efficacious in preventing malaria epidemics. In the last two years, in Palestine, we have obtained ample proof in confirmation of the results of other observers. There is, however, one effect of quinine prophylaxis which has not been sufficiently emphasised, namely, its tendency to mask infections, or maintain a condition of latent infection. This note deals with a series of such infections in two highly malarious areas—Athlit, in Phœnicia, and Ein Harod, in the Valley of Jezreel.

Athlit is a small settlement surrounded on two sides by extensive swamps. In July, 1922, a company which had obtained a salt concession began its operations near the village. A tent camp was set up within a few hundred metres of the swamp. Before three weeks had passed a serious epidemic of malaria broke out. Heroic measures were immediately adopted. All the men were given heavy doses (2 grams daily) of quinine for five days, and then $\frac{2}{3}$ gram daily during the entire

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period. At the same time, active petrolisation was started. The swamps, however, were so extensive, and breeding so active, that complete mosquito control was not achieved. The breeding of mosquitoes was greatly reduced, but adult mosquitoes were found on every inspection.

The first results of the control measures were excellent. The cases dropped rapidly and were kept under control until December 15th, when the bulk of the men were dismissed. The results are shown in the following table :—

MALARIA INCIDENCE IN ATHLIT.

| | No. of men. | No. of cases. | Per cent. Incidence. | Days lost. |
|---|---|---|---|---|
| July ... ... | 80 | 39 | 50 | 315 |
| August ... | 150 | 43 | 30 | 262 |
| September ... | 200 | 20 | 10 | 132 |
| October ... | 200 | 13 | 6·5 | 105 |
| November ... | 200 | 23 | 11·5 | 125 |

The figures given in the table show good results, but there is another side of this picture which is not so pleasing.

Prior to the dispersal of the men, quinine distribution was stopped for four days and the blood of 112 men examined. Thirty parasite carriers were found in these 112 men; twenty-seven malignant tertian and three benign tertian, four of them with gametes. In other words, there were at least 26·8 per cent. parasite carriers in the camp.

The greater number of these men were dispersed to various parts of the country before intensive treatment could be carried out. Each of the thirty parasite carriers thus became a new focus for the dissemination of malaria.

About sixty men remained behind at Athlit. Quinine prophylaxis was stopped in order to give the men a chance to receive malaria attacks and proper treatment. The number of relapses during the months of December, January, February and March totalled fifty-one; about 75 per cent. of the men relapsed once, and 10 per cent. had two or three relapses.

The conclusion from the results presented above is good or bad according to the view point.

1. From the public health standpoint the effect of the quinine was decidedly harmful. By maintaining a condition of latent infection there is a large increase in the number of carriers, and also in the number of cases of chronic malaria extremely resistant to treatment.

2. From the standpoint of the company the results may be said to be good because the prophylactic quinine reduced the sick-rate and resulted in an economic gain.

There is no question, however, that the only point of view which can be considered is that of the public health.

Another instructive instance of the danger of quinine prophylaxis is an epidemic which broke out among the infants of Ein Harod, late in January and early in February, 1923. Ein Harod is a new settlement in the valley of Jezreel. The settlement is surrounded on three sides by breeding-places. To the west is the Wadi Zarain, to the north the Jaloud stream, and to the east an extensive swamp created by the mill-run of a flour mill on the Jaloud. Breeding was active everywhere, and efforts at checking it only partially successful.

In the settlement there were twelve infants, who were kept in a separate nursery under the special care of a nurse. Quinine was administered to those infants daily, with great punctiliousness, by the nurse herself. The children continued quite well, and during the epidemic season only two of the infants had malaria.

On January 24th, quinine distribution was stopped in order to enable us to make a general blood examination of the entire population. On January 29th, one of the infants became ill with malaria. The blood was examined by the local physician; at first the blood was negative, but repeated examinations revealed a few rings diagnosed as malignant tertian malaria. Between that day and February 15th, eleven of the twelve infants became sick with malaria and, according to his report, the physician found with difficulty, and often only after repeated examinations, parasites of malignant tertian malaria in their blood.

There can be little doubt that this outbreak was not a fresh epidemic but an awakening of infections which had been kept latent by the quinine. During the second week of January, the stables of Ein Harod were smoked out and wintering mosquitoes killed. A second smoking, made on January 20th, revealed no mosquitoes in the places previously smoked, and a number of *Anopheles elutus* in a stable not previously smoked. Thereafter, only one or two anopheles were found after repeated search. During the months of January and February no anopheline larvæ were noted in the various inspections made. There was no corresponding

epidemic among the adult population. The parasites were more difficult to find than would have been the case in fresh infections.

This, then, is another instance of the masking of malaria infections by quinine prophylaxis. The effect is evidently the same whether prophylaxis is employed among adults or infants. The only value, and that a doubtful one, is the postponement of the attacks to the non-epidemic season. It is a question, however, whether from the public health standpoint a masked carrier, even though the parasites were under the influence of quinine, is not more dangerous than a patient under observation. Quinine prophylaxis might have its value, but the danger lurking behind it is as great as, if not greater than, the benefit derived from it.

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